

KU-I01

### **Transrectal Ultrasound in Prostate Cancer: Current Utilization, Integration with mpMRI, HIFU and Other Emerging Applications**

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Transrectal ultrasound (TRUS) has been used by Urologists for more than 30 years in prostate imaging and providing guidance for transrectal prostate biopsy. The increase in resolution of TRUS to 9-12 MHz enabled clearer visualization of prostate lesions for targeted biopsies of suspicious regions. Multiparametric MRI (mpMRI) prostate has better ability than TRUS in detection of clinically significant prostate cancer (csPCa), but TRUS is still required for real-time localization of prostate during MRI-Ultrasound fusion prostate biopsy. The accuracy of segmentation (prostate contouring) on both MRI and USG is important to ensure high quality fusion and accurate targeted biopsy.

The availability of the new ultra high-resolution ultrasound, the 29MHz microUltrasound, provides superior resolution and detection of prostate lesions with performance comparable to mpMRI in non-randomized data. The ongoing randomized controlled trial comparing microUSG, mpMRI, and their combination will shed light on the value of microUSG in the MRI era.

In addition to the diagnostic value of TRUS, ultrasound energy in the form of transrectal high-intensity focused ultrasound (HIFU), has been utilized in the past decade for ablation of localized prostate cancer with respectable oncological control and minimal morbidities. For other energies utilized for ablation of prostate cancer, e.g. Cryotherapy or Microwave ablation, MRI-USG fusion guidance provides more accurate tumor targeting than cognitive-guided TRUS during operation.

KU-01

### **Transrectal Ultrasound (TRUS) for Classification of Benign Prostatic Hyperplasia and Evaluation of Male External Urethral Sphincter Complex**

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This presentation will explore the application of Transrectal Ultrasound (TRUS) in the classification of Benign Prostatic Hyperplasia (BPH) and the evaluation of the male external urethral sphincter complex. First, we will delve into the pathophysiology of BPH and its impact on Lower Urinary Tract Symptoms (LUTS), highlighting its clinical significance and diagnostic challenges. Next, the presentation will cover the anatomy and physiology of the prostate and the external urethral sphincter complex, providing a detailed overview of their roles in the male urogenital system. Finally, the focus will shift to the characteristics of TRUS in BPH evaluation, including the appearance of benign prostatic hyperplasia on transrectal ultrasound, methods of estimating prostate size, and the ultrasound classification of BPH. Through this discussion, the critical role of TRUS in the diagnosis and management of BPH and its potential clinical value will be demonstrated.

KU-02

### **Fundamentals of Penile Duplex Ultrasonography: Technique and Clinical Application**

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Penile echo, also known as penile ultrasound or penile Doppler ultrasound, is a diagnostic technique used to evaluate the blood flow, structure, and function of the penis. This non-invasive procedure is

often employed to assess erectile dysfunction, Peyronie's disease, penile trauma, and other abnormalities related to the penile anatomy.

The session is going to discuss procedures and clinical application of penile duplex ultrasonography.

KU-102

### Renal Cortical Elastography: Normal Values and Variations

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**Introduction:** Renal cortical elastography has shown conflicting but promising results in evaluation of chronic kidney disease and other renal disorders. The purpose of this study was to establish a normogram of renal cortical elasticity values and assess their variation between right and left kidney and their relation with age, gender, body mass index, renal dimensions and skin to cortex distance.

**Methods:** The study was a hospital based cross sectional study performed at Tribhuvan University Teaching Hospital, a tertiary care center in Kathmandu, Nepal. All individuals referred for Ultrasound from General Health Check up clinic were included in the study. Patient with abnormal ultrasound findings and abnormal renal function test were excluded from the study. Renal morphometry including length, cortical thickness, and skin to cortex distance were measured in B mode imaging and renal cortical elastography was measured with region of interest box of 1 x 0.5cm. All analyses were done using Statistical Package for Social Sciences 20.0 soft ware.

**Results:** A total of 95 individuals who met the inclusion criteria were included in the study. The mean values of right and left renal cortical shear wave velocity were  $1.49 \pm 0.19$  m/s and  $1.54 \pm 0.19$  m/s respectively. Statistical significant difference was observed between the renal cortical shear wave velocity of right and left kidney. The renal shear wave velocity was seen to decrease with age,

however the correlation was not statistically significant. No significant difference was also noted in renal shear wave velocity among various sex or Body mass index groups. Statistically significant negative correlation was noted between skin to cortex distance and renal cortical shear wave velocities. However no statistically significant correlation was noted between renal dimensions and renal cortical shear wave velocities.

**Conclusions** The normal cortical elasticity values in terms of shear wave velocity of right and left kidney were established. Renal elasticity is independent of the age, gender, Body mass index and renal dimensions.

**KEYWORDS** Renal elastography, Ultrasound, Shear wave elastography Abstract

(Singh H, Pant OB, Khanal U et al (2017) Renal cortical elastography: normal values and variations. J Med Ultrasound 25(4):215–220, <https://doi.org/10.1016/j.jmu.2017.04.003>)

KU-03

### Ultrasonography Measurement of Renal Dimension and Its Correlation with Age, Body Indices, and eGFR in Type 1 Diabetes Mellitus Patients: Real World Data in Taiwan

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**Background:** Assessment of renal size is clinically significant for the screening, diagnosis, and follow-up of renal diseases, forming the basis for clinical decisions. However, the relationship

between renal dimensions, age, body indices, and estimated glomerular filtration rate (eGFR) has rarely been reported in the Chinese type 1 diabetes mellitus (T1DM) population.

**Methods:** A total of 220 T1DM patients were retrospectively analyzed using data from the Chang Gung Research Database in Taiwan. Demographic data, laboratory results, and ultrasonographic images from January 2001 to November 2018 were extracted.

**Results:** Eighty-five participants (38.6%) were male, with a mean age of 34.2 years. The median eGFR was 60.0 mL/min/1.73 m<sup>2</sup>. The mean ultrasonographic left and right renal lengths (LL and RL) were 10.9 ± 1.5 cm and 11.0 ± 1.1 cm, respectively. Renal lengths were longer with increasing body height and weight but shorter with increasing age in patients with T1DM. Trajectory analysis using a linear mixed model revealed no significant trend in eGFR changes during the follow-up period. Additionally, renal length did not significantly predict KDIGO CKD stage 5 in the cohort.

**Conclusions:** Renal length, when compared to reference ranges, offers limited predictive value for renal function decline in T1DM patients.

KU-04

### **Therapeutic Ultrasound Treatment for the Prevention of Chronic Kidney Disease-Associated Muscle Wasting in Mice**

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Low-intensity pulsed ultrasound (LIPUS) is a kind of therapeutic ultrasound. It can help improve bone fracture repair and soft tissue healing. Our previous study found that LIPUS treatment could halt the chronic kidney disease (CKD) progression in mice; unexpectedly, we observed the improvement of CKD-reduced muscle weights by LIPUS treatment. Here, we further tested the

protective potential of LIPUS on CKD-associated muscle wasting/sarcopenia using the CKD mouse models. Mouse models of both unilateral renal ischemia/reperfusion injury (IRI) with nephrectomy and adenine administration were used to induce CKD. LIPUS with condition of 3 MHz, 100 mW/cm<sup>2</sup>, 20 min/day was applied to the kidney of CKD mice. LIPUS treatment significantly reversed the increased serum BUN/creatinine levels in CKD mice. LIPUS effectively prevented the decrease in grip strength, muscle weight (soleus, tibialis anterior, and gastrocnemius muscles), cross-section areas of muscle fibres, and muscular phosphorylated Akt protein expression by immunohistochemistry, and the increase in muscular atrogenes Atrogin1 and MuRF1 protein expression by immunohistochemistry in CKD mice. These results indicated that LIPUS could help improve weak muscle strength, muscle mass loss, muscle atrophy-related protein expression, and Akt inactivation. LIPUS application may be an alternative non-invasive therapeutic intervention on the management of CKD-associated muscle wasting.

KU-P01

### **The Sonographic Appearance of Malfunctional Balloon of Urethral Catheter Stocked in the Prostatic Fossa and Its Management**

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Up to 20% of patients will have a Foley catheter during their hospital stay. A rare complication associated with Foley catheter use is the retention of the catheter due to a failure in balloon deflation. Urologists are typically consulted after several unsuccessful attempts to manipulate and deflate the balloon.

Here we report a case with failure of deflating balloon even interventional sonography for bladder. A 60-year-old male who presented with failure to remove urethral Foley catheter due to un-deflating

balloon. He was a case of lung cancer with multiple metastases admitted for chemotherapy with plural effusion, ascites and urine retention. Failure of removing Foley catheter was noted. Transabdominal sonography was arranged for Interventional needle puncture of the catheter balloon. The sonographic findings showed the balloon was stocked at the prostatic urethra level which sono-guided trans-vesical needle puncture was not feasible. The urologist was consulted for further management.

Managing a retained Foley catheter can be a challenging or even frustrating situation. Patients often experience discomfort, and it's important to prioritize alleviating their anxiety. Bedside or further operative procedures are possible solutions, but the sonographic findings are crucial for clinical decision making. By following a structured algorithm, urologists can efficiently resolve this issue.

KU-P02

**Anomalies of Development of the Urinary Collecting System in three Female Patients Presented with Hydro-nephrosis and Recurrent Urinary Tract Infection**

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**Background:** Anomalies of development of the urinary collecting system include pyelocalyceal diverticulum, megacalycosis, Ureteropelvic junction stenosis(UPJ stenosis), duplex collecting system, megaureter, ectopic ureter, ureterocele. Reflux nephropathy and recurrent urinary tract

infection are frequent presentations in case of anomalies of development of the urinary collecting system.

**Materials and Methods:** We present 3 kinds of anomalies of development of the urinary collecting regarding bilateral bifid pelvis, left partial duplication and UPJ stenosis. The first kind anomaly deals with 52- year-old female presented to outpatient department in 2010/11/6 with urinary tract infection and was proved to be bilateral bifid pelvis by intravenous pyelogram and computerized tomography. The second kind of anomaly deals with 50-year-old female presented to outpatient department in 2013/09/18 with urinary tract infection and was proved to be left partial duplication of ureter by intravenous pyelogram and computerized tomography. The third kind of anomaly deals with 43-year-old female presented to emergency department in 2015/06/06 with urinary tract infection and was proved to be UPJ stenosis by intravenous pyelogram and computerized tomography.

**Results:** Using B-scan ultrasound, left hydronephrosis was noted in left UPJ stenosis; left hydronephrosis was found in bilateral bifid pelvis; and left hydronephrosis and interposition of left renal pelvis were noted in left partial duplication of ureter. Further examinations with computerized tomography and intravenous pyelography revealed two distinct ureters fuse before the ureteropelvic junction in bifid pelvis; two distinct ureters fuse after the ureteropelvic junction and before entering the bladder; and post-stenosis dilatation in UPJ stenosis. These patients also had recurrent history of mild urinary tract infections thereafter due to prevention of urinary tract infection with probiotics and cranberry.

**Conclusion:** RET (Rearranged in Transfection) with its signaling components mutation contributes to 5-30 % congenital anomalies of the kidneys or lower urinary tract(CAKUT).The interposition of pelvis and hydro-nephrosis noted on B-mode ultrasound may suggest further confirmation of these anomalies of development of the urinary collecting system. In terms of duplication of ureter, upper moiety ureter is prone to obstruction while lower moiety ureter is

vulnerable to reflux. Some hereditary human syndromes, such as Branchio-Oto-Renal syndrome, Kallman syndrome, and Beckwith-Weidemann syndrome are associated with duplication of pelvis or ureter. Long term prevention of urinary infection with probiotics and cranberry are necessary in these

cases to prevent serious complicated urinary infection requiring admission.

**(Key words:** B-scan ultrasonography, bifid pelvis, interposition of renal pelvis, hydro-nephrosis, duplication of ureter, UPJ stenosis)